REMARKS

Reconsideration of the present application is respectfully requested on the basis of the following particulars.

1. In the Claims

In the Office Action, claims 5-14 stand rejected as being of improper dependent form due to multiple claim dependencies. Applicants note that a preliminary amendment was filed on November 21, 2001 wherein the multiple dependencies in the claims had been removed. In the preliminary amendment, claims 1-20 were amended to remove the multiple dependencies and to place the claims more in conformance with U.S. claiming style.

Applicants submit that the amendments in the preliminary amendment did not narrow the scope of the claims and were not in response to a rejection made by the Examiner.

Applicants resubmit herewith the claim amendments in the preliminary amendment which overcome the objection of claims 5-14 in the present application. Applicants request that the Examiner consider claims 5-14 in view of these amended claims.

Accordingly, in view of the amendments to the claims in the preliminary amendment, Applicants respectfully request withdrawal of the objection of the claims.

2. Rejection of Claims 1, 3, 4 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,452,843 (Kaule et al.) in view of DE 41 26 461 (Hoppe et al.)

Claims 1, 3, 4 and 15-19 presently stand rejected as being obvious over the combination of the Kaule et al. and Hoppe et al. disclosures. Applicants respectfully

traverse this rejection on the basis that the Kaule et al. and Hoppe et al. disclosures, whether considered collectively or individually, fail to disclose or suggest the feature of luminescent material showing stimulated emission of radiation, as recited in independent claims 1, 15, 18 and 19. Thus, claims 1, 15, 18 and 19 are patentable. Claims 3 and 4, which depend directly and indirectly from claim 1, and claims 16 and 17, which depend from claim 15, are thus patentable based on their dependency from either claim 1 or 15 and their individually recited features.

A feature in each of claims 1, 15, 18 and 19 is that luminescent substances are used whose structure forms an optical resonator in which at least one dye can be excited to show stimulated emission. The Office Action has simply made no showing of this feature in each of the cited references used to reject claims 1, 3, 4 and 15-19.

Turning to the cited references, it is clear that the Kaule et al. disclosure describes luminescing substances on the basis of host lattices doped with rare earth metals. The host lattice absorbs essentially in the whole visible region and in the near IR-region, but has an optically transparent region in which the luminescing substance exclusively emits. Emission lying outside the optical window are suppressed by the absorption property of the host lattice. (column 2, line 62 to column 3, line 14). By appropriately selecting the absorbing lattice components, the optical window can be provided in a region different from the visible or near IR-region yielding a luminescent substance having no emissions in the respective regions. Such luminescing substances are explained by the Kaule et al. disclosure as being difficult to detect. (column 2, lines 34 to 38).

In effect, the Kaule et al. disclosure describes conventional luminescent substances, wherein upon excitation with a suitable wavelength, show spontaneous emission of a similar or different wavelength. On the contrary, the present application recites in claims 1, 15, 18 and 19 the use of luminescent substances that are excited to show stimulated emission.

The disclosure of Hoppe et al. fails to make up for the shortcomings of the Kaule et al. disclosure. As understood, the Hoppe et al. disclosure describes dye-loaded molecular sieves and methods for producing them. The dye materials are used as pigments and optical data memories. It is known that optical data memories must have high durability and high reliability in data reproduction. In order to obtain such properties, water-insoluble organic dyes having a molecular size exceeding the free pore diameter of the voids within the molecular sieve are enclosed irreversibly within the molecular sieve structure.

There appears to be no disclosure or suggestion in the Hoppe et al. disclosure regarding documents of value, and the detection and identification of authenticity features. Also, there is no correlation disclosed between requirements for authenticity features and properties of the dye materials by the Hoppe et al. disclosure. Moreover, the Hoppe et al. disclosure is silent regarding the emission behavior of dye materials upon excitation.

In view of these observations, Applicants submit that the Kaule et al. and Hoppe et al. disclosures, whether considered collectively or individually, fail to disclose or suggest the features of claims 1, 3, 4 and 15-19 of the present application. Moreover, the Office Action fails to present any evidence in the teachings of the Kaule et al. and Hoppe et al. disclosures that would motivate one skilled in the art to make the document of value of claim 1 or the security element of claim 15, and devise the methods of claims 18 and 19. Such evidence is a prerequisite in making a rejection under 35 U.S.C. 103(a), and Applicants submit that the Office Action fails to provide any evidence nor is any such evidence available in either of the Kaule et al. and Hoppe et al. disclosures.

Upon a review of the rejection of the claims, it appears that the difference between excited and stimulated emission was not appreciated. More specifically, it is well understood that a substance which has been excited by absorption of

electromagnetic radiation energy (photons) may emit energy in one of two ways: spontaneous emission and stimulated emission.

Spontaneous emission occurs when a photon is emitted in a unpredictable direction such that emission occurs in all directions. On the other hand, stimulated emission occurs in a system which has been excited (raised to a higher energy level) and wherein the system is stimulated by a photon having a suitable energy to return to a former lower energy level. Upon returning to the lower energy level, a photon is emitted which leaves the system simultaneously with the stimulating photon, and which is identical to the stimulating photon with respect to energy, emission direction and oscillation. Accordingly, there is an amplification effect because one photon enters the system and two photons leave the system.

The amplification effect is further enhanced by a laser resonator usually comprising of at least two mirrors which reflect emitted light back into the optical amplifier and a laser to provide a higher photon density and more stimulated emission. High photon density is essential to stimulated emission because stimulated emission is only possible in radiation fields of high intensity. Below a threshold value, which is characteristic for each system, only spontaneous emission is possible. Therefore, the emission behavior exhibits an immediate change upon reaching the radiation intensity threshold required for stimulated emission.

The luminescent substances used in accordance with the claims of the present application can be easily detected and identified. Thus, these substances are very advantageously used in marking applications. The intraparticle resonator of the molecular sieve structure greatly reduces the luminescence line width of the system upon excitation. This permits differentiation of a large number of different dyes via the spectral positions of their luminescence spectra, and consequently, formation of a plurality of different codings. (present application on page 3, second to last paragraph; page 4, last paragraph).

Another advantage of the luminescent substances according to the present application is the threshold behavior. (page 5, third full paragraph). The threshold behavior relates to the abrupt transition to stimulated emission when optical irradiance exceeds a threshold value characteristic of the system. A detectable change in luminescent properties of the system accompanying the abrupt transition from spontaneous to stimulated emission allows, for example, the formation of authenticity features which become recognizable only after excitation with corresponding high intensity radiation (Figure 2; page 9, first full paragraph), or the combination of authenticity features with camouflage prints. (Figure 3; page 9, second full paragraph). The camouflage print contains a usual luminescent material which behaves like the luminescent material according to the present invention as long as excitation is performed with a laser power density below the threshold value for stimulated emission of the inventive luminescent material (subliminal excitation). Upon supraliminal excitation the emission behavior of the inventive luminescent material, which forms the authenticity feature, changes and the authenticity feature become visible.

The laser-like behavior of the luminescent material of the present invention, in particular the emission of coherent radiation and the threshold behavior, is illustrated in Figures 5 and 6 and the corresponding description beginning at the last paragraph of page 9 and extending to page 10.

Applicants assert that the disclosures of Kaule et al. and Hoppe et al., whether considered alone or together, do not contain any disclosure regarding luminescent material showing stimulated emission of radiation and thus operate according to different principles than those recited in the pending claims of the above-application. Moreover, neither the Kaule et al. nor the Hoppe et al. disclosures possess the aforementioned advantages of the embodiments recited in the present application.

In view of these observations, Applicants respectfully request withdrawal of this rejection.

3. Rejection of Claims 1-4 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,165,592 (Berger et al.) in view of DE 41 26 461 (Hoppe et al.)

Claims 1-4 and 15-19 presently stand rejected as being obvious over the combination of the Berger et al. and Hoppe et al. disclosures. Applicants respectfully traverse this rejection on the basis that the Berger et al. and Hoppe et al. disclosures, whether considered collectively or individually, fail to disclose or suggest the feature of luminescent material showing stimulated emission of radiation, as recited in independent claims 1, 15, 18 and 19. Thus, claims 1, 15, 18 and 19 are patentable. Claims 3 and 4, which depend directly and indirectly from claim 1, and claims 16 and 17, which depend from claim 15, are thus patentable based on their dependency from either claim 1 or 15 and their individually recited features.

The Berger et al. disclosure describes a document of value having an optical security attribute. The optical security attribute is provided with doping material and is formed in a foil structure which is applied to the document by means of an adhesive layer. The document of value optionally has at least one transparent layer in the foil structure (column 1, lines 15-25). Doping materials in the form of luminescent substances are provided in the adhesive layer and/or transparent layer of the foil structure. (column 2, lines 55-61). The Berger et al. disclosure indicates that it is preferable that luminescent substances are small-band fluorescent substances. (column 4, lines 12-14).

As with the Kaule et al. disclosure discussed above, the Berger et al. disclosure uses conventional luminescent substances such as those that upon excitation with a suitable wavelength show spontaneous emission of a similar or

different wavelength. There is simply no disclosure or suggestion of using stimulated emission.

As detailed above, the Hoppe et al. disclosure equally does not disclose or suggest using stimulated emission. Consequently, the Hoppe et al. disclosure fails to make up for the shortcomings of the Berger et al. disclosure.

Therefore, Applicants assert that the disclosures of Berger et al. and Hoppe et al., whether considered alone or together, do not contain any disclosure regarding luminescent material showing stimulated emission of radiation.

In view of these observations, Applicants respectfully request withdrawal of this rejection.

4. Conclusion

In view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that each and every pending claim in the present application be allowed and the application be passed to issue.

If any issues remain that may be resolved by a telephone or facsimile communication with the Applicants' Attorney, the Examiner is invited to contact the undersigned at the numbers shown below.

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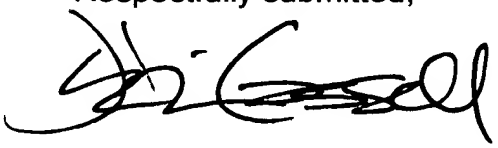
Respectfully submitted,



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